

REMARKS/ARGUMENTS

Prior to entry of this amendment, claims 1-19 are pending in the subject application. By the instant amendment, claim 1 is amended and claims 20 and 21 are added. Applicants respectfully submit that no new matter is introduced by these amendments. Claims 1, 10 and 16 are independent.

Applicants appreciate the Examiner's consideration of the Information Disclosure Statements filed on February 5, 2004, and July 27, 2004.

Applicants also appreciate the Examiner's acknowledgement of applicants' claim for foreign priority and receipt of a certified copy of the priority document.

Applicants respectfully request that, in the next Office action, the Examiner indicate whether the drawings filed on August 6, 2003, are accepted.

Claims 1-21 are presented to the Examiner for further or initial prosecution on the merits.

A. Introduction

In the outstanding Office action, mailed May 31, 2005, the Examiner rejected claims 1-19 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,391,793 to Lee et al. ("the Lee et al. reference"), rejected claims 1-19 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,794,307 to Chen ("the Chen et al. reference"), rejected claims 1-19 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 4,410,396 to Somers ("the Somers et al. reference"), and rejected claims 1-19 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,132,522 to Verhaverbeke ("the Verhaverbeke et al. reference").

B. Asserted Anticipation Rejection over the Lee et al. Reference

In the outstanding Office action, the Examiner rejected claims 1-19 under 35 U.S.C. § 102(e) as being anticipated by the Lee et al. reference. Applicants respectfully submit that

the Lee et al. reference fails to anticipate the present invention, and applicants respectfully submit that the instant amendment to claim 1 further defines the present invention over the cited prior art.

Organic stripping compositions of the present invention remove residues after dry etching and / or ashing and prevent pitting of an Si layer and / or damage to a layer including at least one material selected from the group consisting of W, Al, Ti, TiN, and CoSi. The cited references are silent on these features of the present invention.

In particular, the subject matter recited in the claims of the subject application is directed to organic stripping compositions which strip organic residues while avoiding excessive etching of silicon. *See, e.g., paragraph [0001] of the subject application.* In particular, these organic stripping compositions incorporate an oxidizing agent to oxidize silicon to silicon dioxide in order to inhibit the removal of silicon. *See, e.g., paragraph [0050] of the subject application.*

In contrast, the etching compositions disclosed in the Lee et al. reference aggressively etch silicon. *See, e.g., column 6, lines 3-6 of the Lee et al. reference.* Thus, it is apparent that the organic stripping compositions of the present invention exhibit significantly different silicon etching properties from those disclosed in the Lee et al. reference.

Further, applicants note that claim 1 recites, in part, “a sufficient amount of an oxidizing agent to control the pH of the composition within the range of from about 6.5 to about 8.0.” However, the Lee et al. reference fails to disclose this claim element. The Examiner asserts that the Lee et al. reference teaches an oxidizing agent and teaches a pH range of 7 to about 8. However, this does not amount to disclosing that the amount of oxidizing agent present in the etchant is sufficient to control the pH in the stated range. As set forth in the specification of the subject application, the etching of silicon can be retarded “by adding an appropriate amount of an oxidizing agent.” *See, e.g., paragraph [0051] of the*

subject application. Accordingly, the failure of the Lee et al. reference to disclose this claim element is significant.

Independent claims 10 and 16 recite claim elements identical to those addressed above regarding claim 1. Accordingly, applicants respectfully submit that the Lee et al. reference fails to disclose each and every element of claims 1, 10 and 16. The remaining rejected claims depend, either directly or indirectly, from claims 1, 10 and 16 and, therefore, applicants respectfully submit claims 1-16 are allowable. Additionally, the Examiner failed to show how each and every aspect of the claimed methods are disclosed by the Lee et al. reference. For example, no showing was made regarding claim 12, which recites “wherein at least one layer comprising a material selected from the group consisting of W, Al, Ti, TiN and CoSi is exposed by the etching.” Accordingly, applicants respectfully request that this rejection be reconsidered and withdrawn.

C. Asserted Anticipation Rejection over the Chen et al. reference

In the outstanding Office action, the Examiner rejected claims 1-19 under 35 U.S.C. § 102(e) as being anticipated by the Chen et al. reference. Applicants respectfully traverse this rejection, and submit that the Examiner failed to set forth a *prima facie* case of anticipation. The Examiner asserts that the Chen et al. reference teaches an oxidizing agent and teaches a pH range of from about 4 to about 14. However, in much the same manner as discussed above with regard to the Lee et al. reference, this does not amount to disclosing or teaching a sufficient amount of an oxidizing agent to control the pH of the composition within the range of from about 6.5 to about 8.0, as recited in claim 1.

Further, the Chen et al. reference fails to disclose a composition including a hydroxyl ion (OH⁻), as recited by claim 1. In particular, the Chen et al. reference discloses that tetramethylammonium fluoride is generated from a reaction mixture of tetramethylammonium hydroxide and hydrofluoric acid, such that the hydroxyl ion of the

tetramethylammonium hydroxide is reacted with the hydrogen ion of the hydrofluoric acid to generate water. Accordingly, the hydroxyl ion does not exist in the final composition. See, e.g., the Chen et al. reference at col. 5, lines 4-10.

Independent claims 10 and 16 recite claim elements identical to those addressed above regarding claim 1. Accordingly, applicants respectfully submit that the Chen et al. reference fails to disclose each and every element of claims 1, 10 and 16. The remaining rejected claims depend, either directly or indirectly, from claims 1, 10 and 16 and, therefore, applicants respectfully submit that the Examiner failed to set forth a *prima facie* case of anticipation with regards to claims 1-16. Additionally, the Examiner failed to show how each and every aspect of the claimed methods are disclosed by the Chen et al. reference. For example, no showing was made regarding claim 12, which recites “wherein at least one layer comprising a material selected from the group consisting of W, Al, Ti, TiN and CoSi is exposed by the etching.” Accordingly, applicants respectfully request that this rejection be reconsidered and withdrawn.

D. Asserted Anticipation Rejection over the Somers et al. reference

In the outstanding Office action, the Examiner rejected claims 1-19 under 35 U.S.C. § 102(e) as being anticipated by the Somers et al. reference. Applicants respectfully traverse this rejection, and submit that the Examiner failed to set forth a *prima facie* case of anticipation. The Examiner asserts that the Somers et al. reference teaches an oxidizing agent and teaches the claimed pH range. However, as discussed above, this does not amount to teaching that the amount of oxidizing agent present in the etchant is sufficient to control the pH in the stated range.

Further, applicants respectfully submit that the Somers et al. reference fails to anticipate the pH range of “from about 6.5 to about 8.0” that is recited in claim 1. The passage from Somers that the Examiner quoted states “one has to make certain that the pH at

the surface being stripped remains *below* that at which smut formation occurs (*5.3 in the case of copper*)” and also states that “it has been found that an initial pH of *not more than 4.0* produces an effective system.” *Office action of May 31, at page 8, bottom of page (emphasis added)*. A pH of below 5.3 is not within the claimed pH range of from about 6.5 to about 8.0. Further, there is no other disclosure or suggestion in the Somers et al. reference of a composition having a pH within the claimed range.

Independent claims 10 and 16 recite claim elements identical to those addressed above regarding claim 1. Accordingly, applicants respectfully submit that the Somers et al. reference fails to disclose each and every element of claims 1, 10 and 16. The remaining rejected claims depend, either directly or indirectly, from claims 1, 10 and 16 and, therefore, applicants respectfully submit that the Examiner failed to set forth a *prima facie* case of anticipation with regards to claims 1-16. Additionally, the Examiner failed to show how each and every aspect of the claimed methods are disclosed by the Somers et al. reference. For example, no showing was made regarding claim 12, which recites “wherein at least one layer comprising a material selected from the group consisting of W, Al, Ti, TiN and CoSi is exposed by the etching.” Accordingly, applicants respectfully request that this rejection be reconsidered and withdrawn.

E. Asserted Anticipation Rejection over the Verhaverbeke et al. reference

In the outstanding Office action, the Examiner rejected claims 1-19 under 35 U.S.C. § 102(b) as being anticipated by the Verhaverbeke et al. reference. Applicants respectfully traverse this rejection, and submit that the Examiner failed to set forth a *prima facie* case of anticipation. The Examiner asserts that the Verhaverbeke et al. reference teaches an oxidizing agent and the claimed pH range. However, in much the same manner as discussed above, this does not amount to disclosing or teaching that the amount of oxidizing agent present in the etchant is sufficient to control the pH in the stated range.

Further, applicants respectfully submit that the Examiner's rejection fails to show how the Verhaverbeke et al. reference anticipates the claimed pH range of "from about 6.5 to about 8.0" because the cited passage in the Verhaverbeke et al. reference does not state any pH value, but rather merely states a general principle that diluting the disclosed etchant lowers its pH value. Applicants respectfully submit that the Verhaverbeke et al. reference fails to disclose *any* composition having a pH in the claimed range. Indeed, the only disclosures of specific pH values falling within the claimed range are in the Background of the Invention section, where the Verhaverbeke et al. reference points out problems associated with a neutral pH deionized water rinse and pH 7 solutions. *The Verhaverbeke et al. reference, col. 2, lines 8-28 and lines 45-50.*

Finally, the Verhaverbeke et al. reference fails to disclose a *single* composition that includes a hydroxyl containing compound, a fluorine ion containing compound *and* an oxidizing agent. Rather, the Verhaverbeke et al. reference discloses a series of compositions for "sequential chemical processing," each containing, at most, a subset of the claimed compounds. For example, the Verhaverbeke et al. reference states that *three separate solutions* may be used *in sequence*, the first containing hydrogen peroxide and ammonium hydroxide, the second containing hydrogen peroxide and hydrochloric acid, and the third containing hydrofluoric acid. *The Verhaverbeke et al. reference, col. 9, lines 34-41.*

Independent claims 10 and 16 recite claim elements identical to those addressed above regarding claim 1. Accordingly, applicants respectfully submit that the Verhaverbeke et al. reference fails to disclose each and every element of claims 1, 10 and 16. The remaining rejected claims depend, either directly or indirectly, from claims 1, 10 and 16 and, therefore, applicants respectfully submit that the Examiner failed to set forth a *prima facie* case of anticipation with regards to claims 1-16. Additionally, the Examiner failed to show how each and every aspect of the claimed methods are disclosed by the Verhaverbeke et al.

reference. For example, no showing was made regarding claim 12, which recites “wherein at least one layer comprising a material selected from the group consisting of W, Al, Ti, TiN and CoSi is exposed by the etching.” Accordingly, applicants respectfully request that this rejection be reconsidered and withdrawn.

F. New Claims

Claims 20 and 21 are added by the instant amendment. No new matter is added, and support for these claims can be found at, e.g., paragraphs [0041] and [0053] of the specification as originally filed. Claims 20 and 21 depend, either directly or indirectly, from claim 1 and, accordingly, are believed to be allowable for at least the reasons set forth above regarding claim 1. Entry and examination of claims 20 and 21 is respectfully requested.

G. Conclusion

Since the cited prior art relied on to reject the claims of the subject application fails to disclose or even suggest the present invention as recited in claims 1-21, applicants respectfully submit that these claims are now in condition for allowance, and a notice to that effect is respectfully requested.

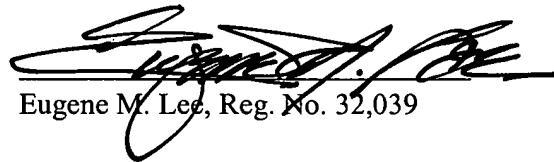
If the Examiner believes that additional discussions or information might advance the prosecution of the instant application, the Examiner is invited to contact the undersigned at the telephone number listed below to expedite resolution of any outstanding issues.

In view of the foregoing amendments and remarks, reconsideration of this application is earnestly solicited, and an early and favorable further action upon all the claims is hereby requested.

Respectfully submitted,

LEE & MORSE, P.C.

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PETITION and
DEPOSIT ACCOUNT CHARGE AUTHORIZATION

This document and any concurrently filed papers are believed to be timely. Should any extension of the term be required, applicant hereby petitions the Director for such extension and requests that any applicable petition fee be charged to Deposit Account No. 50-1645.

If fee payment is enclosed, this amount is believed to be correct. However, the Director is hereby authorized to charge any deficiency or credit any overpayment to Deposit Account No. 50-1645.

Any additional fee(s) necessary to effect the proper and timely filing of the accompanying-papers may also be charged to Deposit Account No. 50-1645.